APPENDIX B:

WATER MANAGEMENT PLAN

HANNA DRAW COALBED METHANE EXPLORATION PROJECT
WILLIAMS PRODUCTION RMT COMPANY

WATER MANAGEMENT PLAN

LANDS INVOLVED:
T23N, R81W, SECTIONS 12, 13, AND 14

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Williams Production RMT Company's (Williams's) proposed Hanna Draw Coalbed Methane (CBM) Exploration Project (Project) is located approximately 10 mi northeast of Hanna, Wyoming, in Carbon County. This proposed Project consists of up to nine federal mineral wells and up to 16 wells on private land within the Medicine Bow River drainage (see Figure 1.1 in the EA). The total number of wells to be drilled as part of the proposed project will not exceed 25. The proposed wells involve minerals that are administered by the Bureau of Land Management (BLM), Rawlins Field Office.

Drilling and water production will determine whether CBM production can be established in Hanna Draw. Unproductive well holes will be plugged and abandoned as soon as practicable after the conclusion of production testing. Wells capable of production will be tested for up to 18 months using a total containment reservoir as discussed later in this document. Sundry Notices (Form 3160–5) will be submitted to the BLM for production activities and facilities.

Name, number, and location information for the 16 potential wells, nine existing wells, and seven contingency well locations is listed in Table B.1.

1. STATE OF WYOMING REQUIREMENTS

Williams has applied for and received Reservoir Permit 11084R to appropriate surface water from the Wyoming State Engineer's Office (WSEO). In addition, Williams has applied to the Wyoming Department of Environmental Quality (WDEQ) for a National Pollutant Discharge Elimination System (NPDES) permit to discharge produced water. Any other necessary ground water or surface water permits determined to be necessary will be obtained. No new reservoirs, downstream diversions, or modifications to existing reservoirs are planned.

2. WATER MANAGEMENT PLAN

The Hanna CBM Exploration Project is a drilling and testing program involving up to 25 CBM well sites located in the Hanna Draw watershed (see Figure 1.1 in the EA). Water from the

Table B.1 Name, Number, and Location Information for Potential Wells.

Name	Number	Qtr/Qtr Location
Hanna Draw Unit	20	SWSW Section 7, T23N, R80W
Hanna Draw Unit	27	NESE Section 11, T23N, R81W
Hanna Draw Unit	28	SWSE Section 11, T23N, R81W
Hanna Draw Unit	29	SESW Section 11, T23N, R81W
Hanna Draw Unit	30	SWSW Section 11, T23N, R81W
Hanna Draw Unit	36	SWNE Section 11, T23N, R81W
Hanna Draw Unit	37	NENE Section 11, T23N, R81W
Hanna Draw Unit	39	NENW Section 11, T23N, R81W
Hanna Draw Unit	24	SWSE Section 12, T23N, R81W
Hanna Draw Unit	25	NESW Section 12, T23N, R81W
Hanna Draw Unit	26	SWSW Section 12, T23N, R81W
Hanna Draw Unit	86	SWNW Section 12, T23N, R81W
Hanna Draw Unit	87	NENW Section 12, T23N, R81W
Hanna Draw Unit	88	SWNE Section 12, T23N, R81W
Hanna Draw Unit	21	NENE Section 13, T23N, R81W
Hanna Draw Unit	22	SWNE Section 13, T23N, R81W
Hanna Draw Unit	31	NENE Section 14, T23N, R81W
Hanna Draw Unit	32	SWNE Section 14, T23N, R81W
Hanna Draw Unit	33	NENW Section 14, T23N, R81W
Hanna Draw Unit	46	SWSE Section 33, T24N, R81W
Hanna Draw Unit	41	SWSE Section 35, T24N, R81W
Hanna Draw Unit	42	SESE Section 35, T24N, R81W
Hanna Draw Unit	43	NWNE Section 35, T24N, R81W
Hanna Draw Unit	44	NWSE Section 35, T24N, R81W
Hanna Draw Unit	45	SENE Section 35, T24N, R81W
Hanna Draw Unit	1	SWSW Section 13, T23N, R81W
Hanna Draw Unit	9	NWSW Section 13, T23N, R81W
Hanna Draw Unit	10	NESW Section 13, T23N, R81W
Hanna Draw Unit	14	SWNW Section 35, T24N, R81W
Hanna Draw Unit	16	NWNW Section 13, T23N, R81W
Hanna Draw Unit	18	SWNW Section 13, T23N, R81W
Hanna Draw Unit	19	SENW Section 13, T23N, R81W

wells will be conveyed to an earthen surface impounded reservoir located in the E½ of Section 13.

Water Production and Storage

Based on limited data from seven test wells, the maximum initial water discharge rate from each well would be about 550 bpd. The water discharge rate is expected to decrease to about 350 bpd per well during the first 18 months of pumping of each well. Assuming that the 25 wells are phased in over the first 12 months of the exploration program and that water production in each well declines linearly, the total volume of water produced during the exploration program would be 593 acre-feet.

The amount of water produced will depend on the rate at which wells are drilled and the amount of water produced by each well. However, Williams has been pumping seven wells for many months and, based on the data from these seven wells, is confident that the assumption that initial production (550 bbls/day) will decline linearly to 350 bbls/day. TRC Mariah Associates Inc. independently evaluated several scenarios (e.g., putting all 25 wells into production in the first 12 months) and verified that Williams's estimate that 593 acre-ft would be produced over the 18-month exploration project is reasonable, based on the present data.

Williams constructed a reservoir, as shown in Figure 1.1 in the EA, in late 2000 to contain all produced water associated with the exploration program. The reservoir's total available capacity is 500 acre-feet, while maintaining a freeboard of 5 feet. The surface area of the reservoir at this level is 46.35 acres.

The adequacy of this reservoir to meet the produced water storage requirements for the exploration project was determined by considering the above well inflow rates and estimated rates of infiltration, evaporation, precipitation, and surface runoff.

Infiltration rates are conservatively assumed to be negligible.

The pan evaporation rate for the project area is about 60 inches, while reservoir evaporation, representing anticipated conditions, is approximately 42 inches. Assuming an average surface area of 35 acres, 183.8 acre-feet of water would be evaporated during the 18-month exploration phase.

The average annual precipitation for this area, based on 49 years of data for the Rawlins Airport's weather station, is 9.29 inches. Therefore, 53.82 acre-ft of water would be added through precipitation.

Runoff to the reservoir during the 25-year/24-hour point precipitation event (2.0 inches based on the National Oceanic and Atmospheric Atlas 2, Volume II) was estimated using the National Resource Conservation Service's TR55 method. The total runoff volume for the 25-year storm event (assumed to occur once during the 18-month exploration project) is estimated to be 13.2 acre-feet from the 114.2 acres tributary to the reservoir site. However, collection ditches will be constructed above the reservoir to route runoff away from the reservoir and into the downstream drainages. This calculated runoff amount is based upon the following assumptions:

- the area below the 6,920-ft contour is assumed to have a CN value of 100 (i.e., all rainfall becomes runoff); and
- the area above the 6,920-ft contour is assumed to have a CN value equal to 85 using type D soils with sage cover in poor hydrologic condition.

Using the above data, the reservoir water balance is shown in Figure B.1.

The calculations indicate that the volume of produced water will not exceed the capacity of the reservoir. However, if at any time it appears that the reservoir capacity will be exceeded, Williams will implement management options that will prevent the need to discharge water from the reservoir. These options include shutting in wells or reducing the rate of water discharge in one or more wells. Either of these actions would slightly reduce the amount of information Williams may obtain concerning the productivity of a given well but would not adversely affect its ability to assess the field for possible production.

Figure B.1 Reservoir Water Balance.

Water Quality

A composite sample of the six currently producing Hanna Draw wells on fee land was collected and analyzed. These results are summarized and compared with Wyoming groundwater quality standards in Table 3.5 in the EA. The data indicate that the water is suitable for livestock, wildlife, and aquatic life, the only uses contemplated for the stored water, and treatment of the water will not be necessary. The terms and conditions of the permits issued by the WSEO donot require monitoring. The NPDES permit will require monitoring consistent with protecting the designated uses of the reservoir.

Water Transport

Water will be conveyed to the reservoir mentioned above by way of one or two 12-inch buried polyethylene trunkline. The line will surface and outfall above the high water line of the reservoir onto a shallow concave channel that will be rip-rapped to prevent erosion. Each well will interconnect with the 12-inch trunkline by way of one 6-inch buried polyethylene gathering line.

Location and Type of Water Supply for Drilling

Water for drilling the proposed wells will probably be derived from CBM wells that are currently producing on private land adjacent to the federal project lands. The procurement of water will be the responsibility of the drilling contractor. It is estimated that 6,000 barrels of water will be required for drilling each well.

Water Facilities, Including Impoundments

The reservoir will be used to store water only during the 18-month exploration phase of the project. Water in the reservoir will be allowed to evaporate. The private landowner may wish to maintain a reservoir for stock watering, in which case Williams will lower the dam so that

the reservoir's size is more appropriate for use as a stock pond. If the landowner does not wish to use the reservoir, the dam will be removed after all water had evaporated, and the area would be reclaimed.

As noted above, the reservoir has a total available capacity of 500 acre-ft. The relationship between water elevation, reservoir area, and total storage is presented in Table 2.2 in the EA.

Any other water facilities that provide for the beneficial use of produced water from federal wells will be designed site-specifically, using best management practices, to accommodate livestock access to water, to control erosion, and to limit sedimentation. However, at present, there are no plans for water facilities, such as stock tanks, or new stock reservoirs, other than possibly converting the reservoir to a smaller stock reservoir.